

REMARKS

Claims 1-6, 8 and 9 stand rejected as anticipated by U. S. Patent No. 3,633,751 (Stevens). This rejection is respectfully traversed.

The present invention is directed to a microimpactor system, which is useful for removing particles from a fluid. The claimed microimpactor system is formed from multiple stacked sheets which define rows of microimpactor. The microimpactors are oriented transverse to the direction of flow of a fluid through the device.

Stevens describes a mechanical filter that happens to be made up of multiple stacked sheets. Other than the fact that both Stevens' filter and applicant's microimpactor system are both made up of stacked sheets, they have little in common.

The main differences between Stevens' filter and applicant's microimpactor system can be summarized as:

1. Stevens describes a mechanical filter which operates by defining a fluid path having openings that are smaller than the particles that are to be removed from the fluid. The particles therefore become trapped when they reach a section of the fluid path which is too small for the particles to pass through. The present microimpactor is an inertial system. The fluid path through the device is much larger than the size of the particles, so the particles in principal could pass through every opening in the device. Particles are trapped because their inertia does not allow them to navigate the changes in direction needed to allow them to flow around the microimpactors. Therefore, they hit the microimpactors and stick, even though the flow path through the device is large enough to accommodate them. The microimpactor system has several advantages, including the ability to operate at low pressure drops and a greatly reduced tendency to become clogged.

2. Stevens' apparatus does not contain microimpactors that are arranged transverse to the main direction of fluid flow through the device. What Steven's apparatus does is to create localized fluid flows that are more or less parallel to the individual laminae. With this arrangement, the laminae do not function as microimpactors. Instead, some of the laminae define restricted pathways which are smaller than the particles being removed.

Stevens' Figure 9 gives one the sense of how fluids move through his filter. First, it is seen that there is a restricted inlet 8 through which the fluid enters. In the Figure 9

embodiment, the fluid flows roughly downwardly, until it reaches the space between layers 3 and 5 (space 4), at which point the direction of flow is changed to perpendicular to the original direction, i.e., to the left and to the right as shown. Therefore, flow past layer 5 is more parallel to layer 5 than perpendicular thereto, except with respect to fluid that passes down through opening 8 in layer 5 (which then largely flows parallel to layer 5, but underneath it, as shown. Particles are trapped in space 4 between layers 3 and 5, because the distance between layers 3 and 5 is smaller than the particle size.

Figure 9 shows no flow in the space between layers 1 and 3 (space 2), but of course those layers will be filled with fluid, which will circulate in that space in a direction more or less parallel to the laminae.

In Figure 9, layers 3 and 5 are designed as shown in Stevens' figure 4 and 6, respectively. The examiner has based the rejection on the alternative designs of layers 3 and 5, which are shown in Figures 16 and 15, respectively. In Figure 16, tongue of layer 3 is now perforated with elongated slots, as is layer 15. Figures 17 and 18 show how these layers may be stacked with the other layers, but it is important to recognize that these figures are end views, not side views as depicted in Figure 9.

When layers 3' and 5' are incorporated into the Figure 9 diagram, it will be seen that the perforations in layers 3' will permit fluid to flow from space 2 to space 4 through multiple channels, not just the single channel 8 shown in Figure 9. In that case, fluid flow in space 2 will be mainly parallel to layer 3', not substantially transverse thereto as in the present invention. Similarly, fluid flow in space 4 will be mainly parallel to layer 5'.

A difficulty in understanding the Stevens reference is that his drawings are not to scale. Because of this, his Figures are somewhat misleading, and make his device appear more similar to applicant's microimpactor than it really is.

For example, Stevens clearly teaches that particles become trapped in space 4, but can be removed from the device by backwashing. This clearly requires that space 4 is narrower than space 2, but those spaces are shown as approximately equal in his figures. (Keep in mind as well that tongues 14 of layers 3 will bend upwardly during backflow, restricting space 2 even more. Therefore space 2 must be much wider than space 4, contrary to what is shown, in order for particles to be washed back out of the device.)

Similarly, Stevens states that the perforations in layers 3' and 5' are of the order of 1 millimeter whereas the particles being filtered (and hence the width of space 4) is of the

order of 5 microns (column 1 lines 67-72), whereas his Figures 17 and 18 would suggest that those distances are approximately the same.

For these reasons, applicant's invention is clearly distinct from that of Stevens, which is different in both design and mode of operation.

As to claim 8, the secondary reference (Carr) does not address the basic deficiencies of the Stevens reference, and so no combination of the two references leads to the subject matter of claim 8.

A notice of allowance is respectfully requested with respect to all of claims 1-9.

Respectfully submitted,
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